

ESTIMATING GRAPE PHYLLOXERA (HOMOPTERA: PHYLLOXERIDAE) GALL NUMBERS ON SINGLE GRAPE LEAVES^{1, 2}

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ABSTRACT: Linear regression and correlation analyses showed that the number of grape phylloxera *Daktulosphaira vitifoliae* (Fitch) leaf galls on single leaves of *Vitis riparia* Michx. could be estimated by counting galls on one half the leaf, using the midrib as a dividing line, and multiplying that value by a factor of 2.

Experiments evaluating chemical sprays or measuring incidence of foliage damage caused by leaf form (gallicola) of grape phylloxera, *Daktulosphaira vitifoliae* (Fitch), = *Phylloxera vitifoliae* (Fitch), require a time-consuming counting of galls on the ventral sides of leaves. The number of galls produced by phylloxera on grape leaves may range from as few as 1 gall/leaf to >300 galls/leaf, depending on grape variety and time of infestation. When the number of phylloxera galls per leaf is as low as <20 galls/leaf, counts can be made quickly. However, as the number of galls increase, considerably more time is required to make counts.

This report summarizes observations on numbers of grape phylloxera leaf galls on wild grapevines, *Vitis riparia* Michx., and describes a simple method for estimating the total gall numbers on single grape leaves.

Methods

Leaves infested with >20 phylloxera galls per leaf were collected during August from wild *V. riparia* vines growing in the vicinity of North East, Pa. Sample leaves were fully expanded and were selected at random from heights of 1.5-2.1 m above the ground on vines located near commercial wine grape vineyards. In the laboratory, the number of galls on each half of the leaf were recorded. Counts were made on the ventral surface using the midrib as the dividing line between halves. A total of 29,700 galls was counted on 330 leaves.

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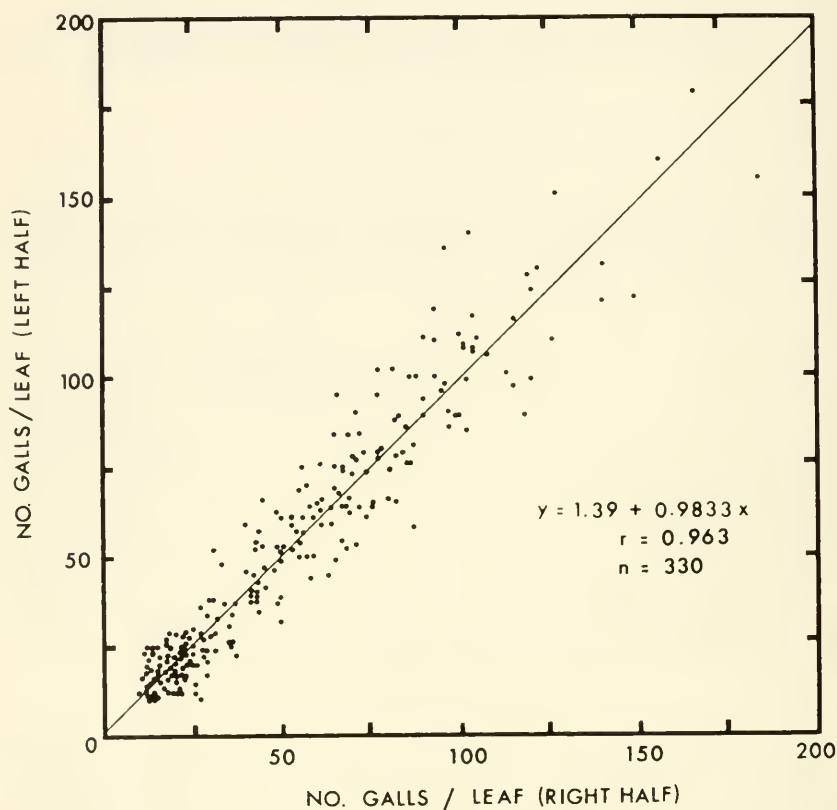


Figure 1. Relationship between number of grape phylloxera galls on ventral right half of *V. riparia* leaf and ventral left half of leaf.

Linear regression and correlation analyses were used to determine the relationship between the number of galls counted on the right and left halves and between the actual number of galls per leaf and the estimated number of galls per leaf.

Results and Discussion

A correlation coefficient of 0.963 indicated a very close relation between the numbers of galls on each half of the leaves (Fig. 1). The number of galls on the right half of the leaves averaged 43.1 (SD = \pm 34.6, range = 10-184).

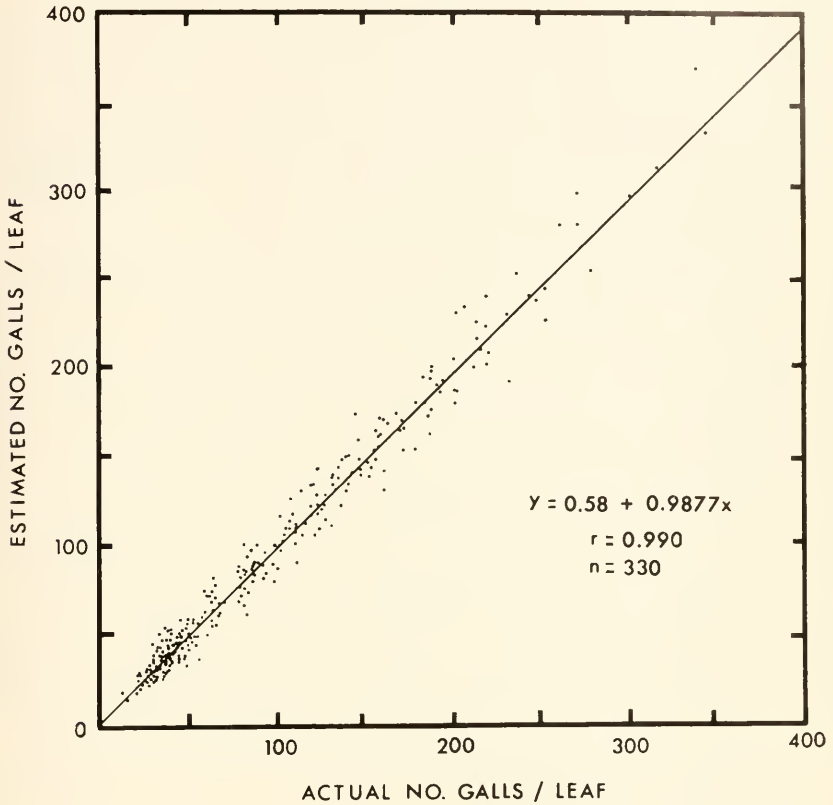


Figure 2. Relationship between actual number of grape phylloxera leaf galls and estimated number of leaf galls.

while the average number on the left half was 43.8 (SD = \pm 35.4, range = 10-179). Standard error of the estimate was 9.6 galls/leaf.

This result indicated that the total number of galls per leaf could be estimated by doubling the number of galls counted on one half of the leaf.

A correlation coefficient of 0.990 indicated a strong relation between actual and estimated counts determined by multiplying a right-half gall count by a factor of 2 (Fig. 2). Actual mean number of galls per leaf counted was 90.0 (SD = \pm 66.5, range = 21-345). Estimated mean number galls per leaf was 89.5 (SD = \pm 66.4, range = 20-348). Standard error of the estimate was 9.4 galls/leaf.

Stevenson (1970) used several methods for evaluating foliage infestations of grape phylloxera and proposed a gall index rating, calculated from the formula, Σ (No. leaves in class x mid-class value)/Total number of leaves examined. Leaf classes were designated according to the number of galls present, 0, 1-5, 6-15, 16-35, 36-75, 76-150, and >150 galls/leaf. Use of this gall index can be facilitated by estimating the total number of galls on single leaves by counting galls on half of each leaf and multiplying that value by 2. In this way, the time may be reduced for counting leaf galls.

Dispersal of grape phylloxera gallicolae over shoots has not been studied in detail, although newly-hatched gallicolae are known to move from galls on older leaves to younger leaves at the shoot tip. Infestation of young leaves occurs in the growing shoot tip before leaves become fully expanded. Apparently phylloxera gallicolae disperse uniformly over both halves of the expanding blade of the young leaf. This uniform distribution of gallicolae and the resulting galls support the method of estimating leaf gall numbers described herein.

LITERATURE CITED

- Stevenson, A.B. 1970. Endosulfan and other insecticides for control of the leaf form of the grape phylloxera in Ontario. *J. Econ. Entomol.* 63(1): 125-128.